

ON THE OCCURRENCE OF *PLANORBIS VORTICULUS*, TROSCHEL,  
IN THE PLEISTOCENE OF ENGLAND, WITH NOTES ON SOME  
OTHER PLEISTOCENE MOLLUSCA.

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WHEN engaged in working out the very large series of molluscan remains obtained from the 100 feet terrace of the Thames at Swanscomb, several immature examples of *Planorbis* were noted, which we could not associate with any recent English species, and we are again indebted to Dr. A. C. Johansen for identifying the form as *Planorbis vorticulus*, Troschel, a species which had not hitherto been detected in these Islands, either fossil or recent. Since then we have recognized it as occurring in two other Pleistocene deposits, viz., the brickearths of Grays, Essex, which yielded a single example, and the well-known deposit at West Wittering, whence three or four specimens have been collected. We have so far failed to trace it from any other locality. On the Continent it has been recorded fossil from the Pleistocene of Weimar, Burg, and Gräfen in Thuringia by Dr. E. W. Wüst,<sup>1</sup> and from the Holocene (oak period Neolithic) of Refsnoes and Kareboek in Denmark by Dr. A. C. Johansen,<sup>2</sup> and we are informed by Dr. Johansen that it occurs in deposits of the same age in Scandinavia.

It is found living at Malmo according to Westerland, whilst Jordan<sup>3</sup> records it as *P. acies*, Mühlf., from Holland, middle Germany, south-west Germany, Switzerland, and north Italy.

The species is an extremely interesting addition to what may well be termed the old Thames-Rhine fauna. In this country one first recognizes this group of mollusca in the Norwich Crag, where *Corbicula fluminalis* occurs. It is quite possible that *Vivipara media* and *Paludestrina Reevei* also are members, but of this fact no confirmatory evidence is yet forthcoming. In the newer Weybourn Crag we meet with *Lithoglyphus fuscus* and *Vivipara glacialis*, whilst in the Forest Bed there are five fresh forms which can be referred to it—*Nematurella Runtioniana*, *N. stenostoma*, *Valvata fluviatilis*, *Pisidium astartoides*, and *P. supinum*. In the Pleistocene of the 100 feet terrace of the Thames at Swanscomb we have the additional forms of *Vivipara diluviana*, *Neritina Grateloupiana*, *Planorbis vorticulus*, and *Valvata piscinalis*, var. *naticina*, whilst in the still newer Pleistocene of Grays one notes *Pisidium amnicum*, var. *Danubialis*.

<sup>1</sup> E. Wüst, 1901, "Untersuchungen über das Phozän und das älteste Pleistozän Thüringens": Abhandl. Gesell. Halle, xxiii, pp. 218-248.

<sup>2</sup> A. C. Johansen, "Om den Fossile Kvartære Molluskfauna i Danmark": Copenhagen, 1904, p. 66.

<sup>3</sup> Nova Acta Acad. Cæs. Leop.-Carol. Nat. Cur., vol. xlv, No. 4, 1883.

Moreover, in the Holocene, *Planorbis Stroemii* is a noteworthy member of the same group. All these forms are only known fossil in these Islands from the Thames-Rhine system of deposits.

*Umo littoralis*, which first occurs fossil in the 100 feet terrace of the Thames at Swanscomb, and *Paludestrina marginata*, the first appearance of which in these Islands is in the Cromerian (Forest Bed of Norfolk and Suffolk), possibly reached England by two routes: one by means of the Rhine and Thames, whilst the other, since they occur in the Pleistocene of Crophorne, in the Severn River system, was by way of the western rivers of France and the Severn, for the connection between the upper waters of the Severn and the Thames must have been severed for a long period when the Crophorne Bed was deposited. The occurrence of *Corbicula fluminalis*, *Paludestrina confusa*, and *Planorbis vorticulus* at West Wittering furnishes additional proof that the rivers of Sussex were at one time connected with the Thames-Rhine system.

There is one living English species which is a well-marked member of this group, *Assemanina Grayana*, known only from Denmark, Belgium, and the Thames Estuary, but as yet it is unknown in a fossil state, although the name has figured in some lists.

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